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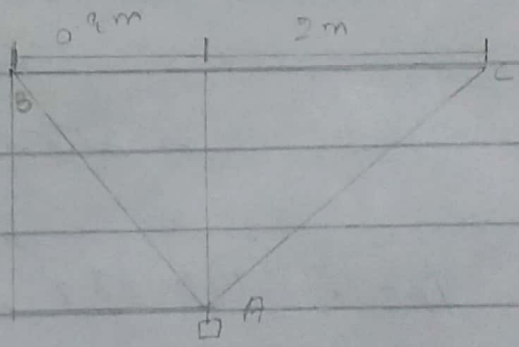
⇒ Section :- EOA03
⇒ ID :- 16073
⇒ Paper :- Mechanics
⇒ Teacher :- Mr. Majid Naeem (sb)
⇒ Department :- BE(C)

⇒ Answer :- 01

Part 1:



Given data:

M = 400 lbs

increase of volume ⇒ ΔAB = 15%

increase of volume ⇒ ΔBC = 35%

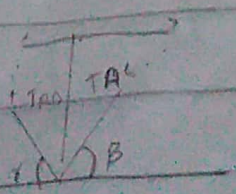
Required

AB = ?

BC = ?

Solution:

$\gamma = \tan^{-1}\left(\frac{1.2}{0.8}\right)$



$\alpha = 56.3°$

$\beta = \tan^{-1}(1.2/2)$

$\beta = 31.0°$

we know that

$M = 400 \text{ lbs} \Rightarrow 400/2.204 = 181.48 \text{ kg}$

$T_{AB} = T_{AB}\Delta_{AB} = 0.15 \times (181.48)(9.81)\left[\cos 56.3 i + \sin 56.3 j\right]$

$= 267.047\left[0.55 i + 0.83 i j\right]$

$T_{AB} = -146.87 i + 221 j \text{ N}$

$T_{AC} = T_{AC}\Delta_{AC} = 0.35(181.48) \times (9.81)$

$\left\{-\cos 31 i + \sin 31 j\right]$

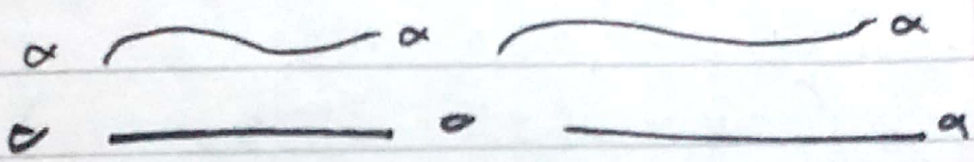
$= 1623.11)\left\{-0.857 i + 0.515 j\right\}$

$T_{AC} = (-543 i + 320 j \text{ N})$

$$\left\{ \begin{array}{l} T_{AB} = -146.87 i + 221 j \text{ N} \\ \quad\quad -534 i \quad\quad + 320 j \text{ N} \end{array} \right\}$$

Part B:-

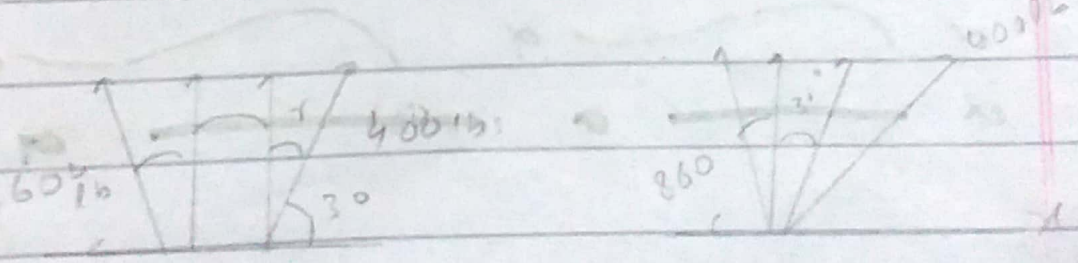
If the water tank increase then weight is % then their stability is no double.



⇒ Answer # 02

Given data:

Sheet of gold = 600 lb



⇒ Required:-

T = ?

θ = ?

⇒ Solution:-

$\Sigma F_x = 0 = -360 - 240 \sin\theta + T \sin 30 + 400 \cos 30 = 0$

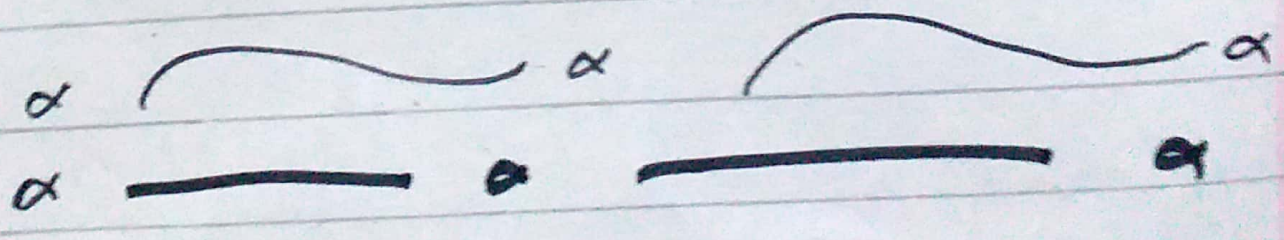
$\Sigma F_y = 0 = 240 \cos\theta + T \cos 30 - 400 \sin 30 = 0$

Numerical solution of eq (1) & (2)

$\therefore (\theta = 21.7°, T = 204 \text{ lb})$ Ans

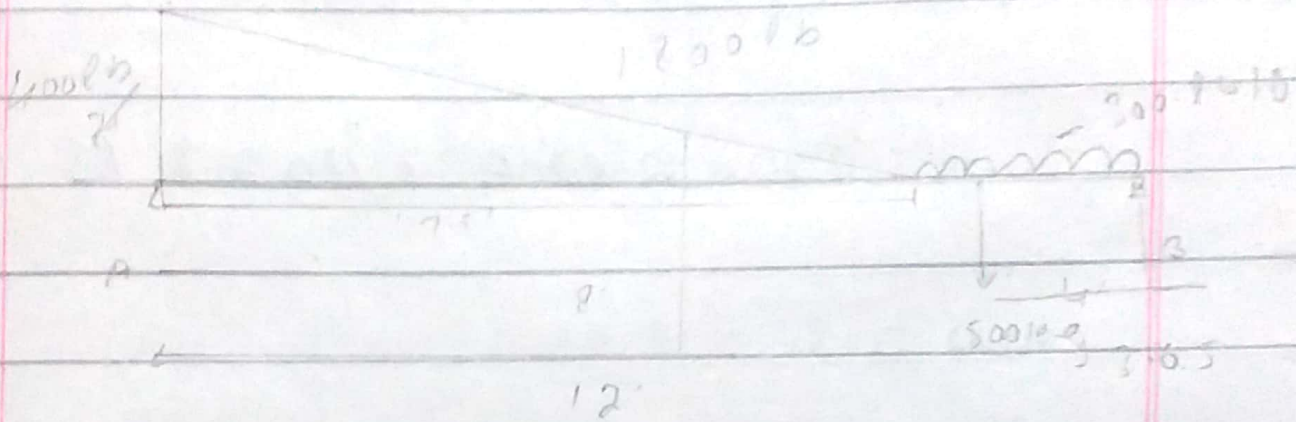
Note:

we could eliminate T between eq 1 & 2 the resulting eq: Transcendental.



⇒ Answer :- 03

Given data:



Required:

AY = ?

BY = ?

Solution:

⇒ UDL = convert to point load

$300 \times 4 = 1200$ lb

at point $= \frac{1}{2} \times 4 = 2'$ from B

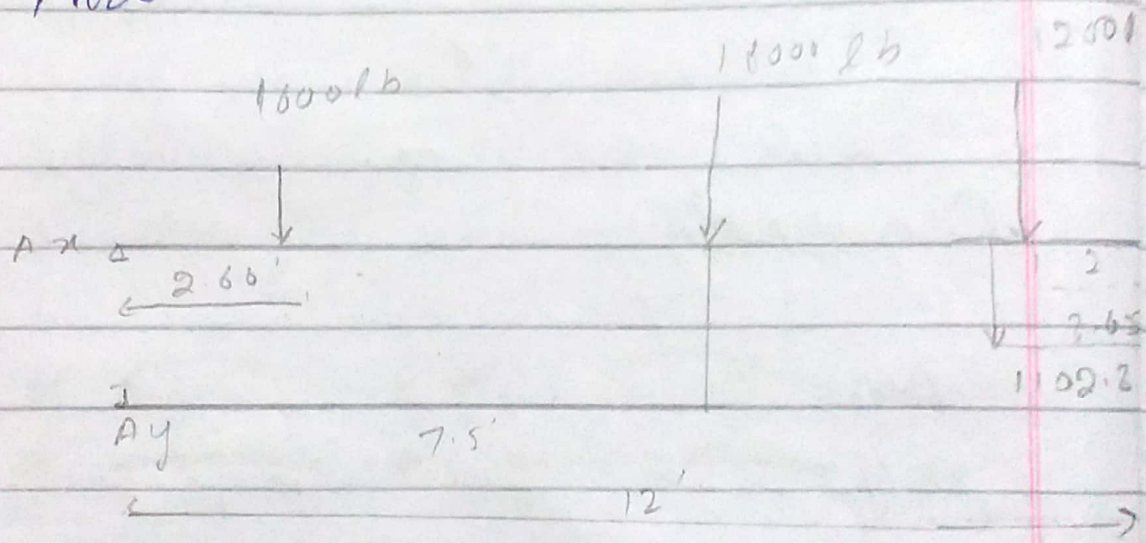
⇒ UVL = $\frac{1}{2} \times 400 \times 8 = 1600$ lb

at distance = $\frac{1}{3} \times 8 = 2.66'$ from A

⇒ One load in Kg
convert to lb

= $500 \times 2.0204 = 1102.31$ lb

Now



$Ax = 0$

$Ay = 0$

$\sum M_A = -1600 \times 2.66 - 18000 \times 7.5 - 1200 \times 10 - 1102.31 \times 8.35 + By \times 12$

$= -4256 - 135000 - 12000 - 9204.28 + By \times 12$

$= -160460.12 + By \times 12$

$By = \frac{+160460.12}{12}$

$= 13371.69 \text{ lb.}$

Ay = ∑ Total Load By 3

Ay = 1200 + 1102.31 + 1800 + 1600

13371.69

Ay = 8530.31 lb

Ay = 8530.31 lb

By = 13371.69

The End